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PM
587
V. 3
no.

IICA

ANIMAL DISEASE REPORT

ANTILLES ZONE

JANUARY - MARCH, 1983

VOL. III No. 1

IICA
PM-
587
V. 3
no. 1



INTER-AMERICAN INSTITUTE FOR COOPERATION ON AGRICULTURE

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BLUETONGUE STUDIES IN THE CARIBBEAN

This paper is a report based on :

"A Serological Survey of Ruminant Livestock in some Countries of the Caribbean Region and South America for Antibody to Bluetongue Virus - Inter-American Institute for Cooperation on Agriculture Bluetongue Programme" by E.P.J. Gibbs BVSC, Ph.D, FRCVS, E.C. Greiner Ph.D, F.C. Alexander MS, MRCVS, T.H. King MRCVS and June Roache BSc.

INTRODUCTION

Bluetongue is an infectious, non-contagious virus disease of ruminants transmitted by biting midges of the genus *Culicoides*. Sheep are mainly affected but the disease has been recorded in cattle, deer and goats.

The only known vector of Bluetongue in the Western Hemisphere is *Culicoides variipennis* in North America, which is not present in Florida, the Caribbean, Central and South America. Several other species including *Culicoides insignis*, *Culicoides pusillus* and *Culicoides furens* are known to occur.

At one time Bluetongue was recorded as a disease restricted to Africa. Since the 1940's, the virus, if not disease, has been recognised in six continents. Until 1972 several Caribbean countries believed that they were free from Bluetongue. Infection is now considered widespread and endemic within the Tropics.

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Clinical Disease has not been recognised in the Antilles Zone. Certain conditions in ruminants have aroused suspicions. Causes for these have often not been determined perhaps due to symptomatic confusion, fairly good recovery and the absence of available investigation resources.

The clinical disease is characterised by Oedema hyperaemia and erosive inflammation of the tissues of the mouth, excessive salivation, catarrhal rhinitis, lachrymation, enteritis and lameness due to inflammation of the coronary bands and sensitive laminae of the feet. In pregnant animals the embryo may be affected leading to reabsorption or abortion, malformations, stillbirth or the birth of stunted lambs or calves.

The economic importance of Bluetongue is associated with the cost/effects of clinical disease and the loss of exports.

Loss of exports has been of growing concern since the serologically positive diagnosis of the virus antibody in 31 of a shipment of 45 Barbados blackbelly sheep in Canada in 1972. During the '60's and '70's Barbados blackbelly sheep were exported to various Caribbean countries, Mexico, Canada and Taiwan. Recently, Mexico, in 1981, refused a shipment of 600 sheep from Barbados because of Bluetongue.

Following the Canadian diagnosis in 1972, Jamaica also found evidence of serologically positive blood samples in sheep as well as in two of sixteen bulls from an artificial insemination centre which led to the cancellation of a shipment of bovine semen to Nigeria.

Ninety percent of a large shipment of buffaloes from Trinidad, found to be serologically positive, were allowed entry into the USA only after costly virus isolation attempts from blood samples were negative.

There is a sizeable trade in small ruminants mainly destined for slaughter between the Eastern Caribbean Islands.

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CARICOM countries have all recently emphasized the need for expanded ruminant development. The possibility for increased animal and germ plasm introductions is evident. The Barbados blackbelly sheep, the Jamaican cattle breeds and the Trinidadian water buffalo have been identified to play significant roles.

A recommended policy governing the movement of these animals and animal products within the region in respect of Bluetongue is required. This is dependent upon the determination of the status of the disease in the countries of the area, the serotypes that exist and upon relevant virus and vector studies.

At the 1st Regional Meeting of the Directors of Animal Health of the Antilles Zone held under the sponsorship of the Inter-American Institute for Cooperation on Agriculture in Barbados in 1981, it was decided to begin a study of the epidemiology of Bluetongue virus in the zone. A serological survey was undertaken to determine the prevalence of antibody to the common group antigen of bluetongue virus in cattle, sheep and goats in the region. This was designed with the assistance and guidance of consultants from the University of Florida. Sentinel herd studies in Barbados, Trinidad and Tobago were also begun to monitor monthly blood samples for sero-conversion and to trap species of Culicoides. At the end of the serological survey, selected positive samples were examined at Pirbright Virus Institute in the United Kingdom for serotype determination.

Materials and Methods

Survey design: In each of the countries listed in Table I, sera were collected from herds/flocks that were in geographically diverse parts of the country. Approximately 2% of the livestock in each country were sampled or 500 sera obtained for each species, whichever was less. The

sample size from any one herd/flock did not exceed 10% of the total number of sera collected from that species in that country and the sample reflected the age structure of the herd/flock, except that animals younger than 6 months of age were omitted. Sera were coded in the country where they were collected and stored at -20°C before they were sent by air freight for testing to the Veterinary Diagnostic Laboratory in Barbados.

Sera were collected with the exception of the sheep sera from Barbados in the early months of 1982.

Serological Testing: All sera were examined by the agar gel immunodiffusion test for antibody to Bluetongue virus (BTID test) as described by Pearson and Jochim (1979). Sera were scored by the system recommended by Pearson and Jochim (1979) but the results presented are categorized only as "negative" or "positive".

RESULTS

Sera Collection

A total of 6,250 sera was collected for the survey. Analysing the data on a regional basis, only with the goat sample was there a significant discrepancy between the number of sera requested (2,480) and that collected (1,581). (Goats are traditionally kept in the Caribbean as "backyard" animals with few people owning more than two or three. Sampling the goat population in the region therefore took disproportionately longer than sampling the sheep and cattle populations; difficulty establishing both ownership and permission to collect sera from goats were often cited as the reasons why the national collection was incomplete.)

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Examination of Sera for Antibody to Bluetongue Virus

The prevalence of antibody to Bluetongue virus as assessed by the BTID test, in ruminants in different countries in the region is presented in Table I. Antibody was detected in cattle, sheep and goats in all countries involved in the survey. The prevalence of antibody was not consistently higher in any one species.

With the exception of Guyana, the majority of the cattle, sheep and goats sampled in each country had antibody to Bluetongue virus. In Guyana, the prevalence of antibody was 50% in sheep, 40% in goats and 56% in cattle; however, a geographical area (Rupununi) was discovered in the hinterland where the serological data indicated that antibody to Bluetongue virus infection was uncommon (Fig 1). Sera were examined from 50 cattle, 25 goats and 25 sheep in the Rupununi. Antibody was detected to the BTID antigen in only 4 cattle (all older than 9 years) and one goat (6 months old).

No other geographical area was discovered where the prevalence of antibody to bluetongue virus differed noticeably from the national average.

Analysis of the distribution of animals with antibody, within age groups, did not indicate a trend. Data presented for Trinidad and Tobago in Table 2 is representative of other countries.

DISCUSSION

This survey has demonstrated that antibody to bluetongue virus antigen is common in cattle, sheep and goats of the 9 countries involved in the survey.

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The BTID test used in this survey detects antibody to the common group antigen of bluetongue virus and is considered to be reliable; antibody is usually detected between 14 and 28 days after infection and persists for at least 3 years (Pearson and Jochim, 1979). This test has been widely used for serological surveys in other parts of the world e.g. Iran (Afshar and Kavvanfar, 1974); Sudan (Eisa, Karrar and Abdel Rahim, 1979); Eastern Hemisphere (Herniman et al., 1980); Australia and Papua-New Guinea (Della-Porta et al., 1983). Recent studies, however, have shown that while the test is simple and the results reproducible it is less sensitive than the enzyme-linked immuno-sorbent assay (Poli et al., 1982); the prevalence of infection detected by this survey should therefore be considered a conservative estimate.

The orbiviruses, of which bluetongue is a member, are characterized by complex serological inter-relationships. There are studies that indicate that the BTID test, as described, detects cross reactive antibody to orbiviruses other than bluetongue virus (Jochim, 1976; Gorman et al., 1979; Snowdon, 1979). As stated earlier, no clinical cases of bluetongue have been confirmed in the survey area nor have bluetongue viruses been isolated from ruminants or arthropods, thus it may be argued that the antibody detected in ruminants in this survey reflects previous infection with orbiviruses closely related to bluetongue virus. This argument cannot be refuted. Recent surveys using the BTID test in Australia, where many different orbiviruses including bluetongue viruses have been isolated (St. George, Cybinski and Standfast, 1982), lead us to the conclusion that it is probable that the majority of ruminants in the Caribbean over the age of one year have been infected with bluetongue virus.

Which of the 22 types of bluetongue virus is/are responsible for the antibody detected in this survey is unknown. Examination of sera from this survey by the serum neutralization test indicates that types of bluetongue virus, hitherto unknown in the Western Hemisphere, may be

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present in the Caribbean Region (Taylor, W.P. Personal Communication, 1983). Cross-reactions can occur between orbiviruses even in the serum neutralisation test; thus, until bluetongue virus isolates are available for typing from the Caribbean Region and South America such data must be considered indicative rather than definitive.

In conclusion, further studies are required on the epidemiology of Bluetongue virus (including virus isolation) in the Caribbean Region and Northern parts of South America before any major changes in policy can be proposed for international movement of animals and germ plasm in the zone.

ACKNOWLEDGEMENTS

The project was supported by the Directors of Animal Health and their staff of the following countries. We should particularly like to thank L. Applewhaite BVSc, MS, MRCVS, Guyana. C.L. Grey DVM, DTVM, MS, Jamaica. R. Liew-a-Joe DVM, Suriname. K.S. Manyam BVSc, MSc, Grenada. V.G. Moe DVM, BS, DICTA, Trinidad & Tobago. B.S. Nisbett BSc, DVM, St. Kitts/Nevis. J.L. Robinson DVM, Antigua. K. Scotland DVM, St. Lucia and V.S. St. John BVMS, Dip. Vet. Path., Barbados. The test reagents were provided by J.E. Pearson DVM, National Veterinary Services Laboratory, United States Department of Agriculture, and Statistical advice was provided by R.L. Carter BA, MS, PhD., Department of Statistics (Biostatistics Unit), University of Florida.

SUMMARY

A serological survey of 6,274 sera from cattle, sheep and goats in 7 Caribbean countries and 2 in South America showed that antibody to bluetongue virus was widely distributed in each species throughout the survey area. Overall prevalences of antibody were 70% in cattle, 66% in sheep and 76% in goats as assessed by the agar gel immuno diffusion test. Within countries the prevalences were Jamaica 77%, St. Kitts/Nevis 70%, Antigua 76%, St. Lucia 82%, Barbados 61%, Grenada 88%, Trinidad & Tobago 79%, Guyana 52% and Suriname 84%. No clinical cases of bluetongue were confirmed in the area surveyed and there are no virus isolates available as yet to indicate which type(s) of virus is/are causing the infection(s).

Table 1 ANTIBODY PREVALENCE TO BLUETONGUE VIRUS
IN RUMINANTS IN THE CARIBBEAN REGION

<u>COUNTRY</u>	<u>CATTLE</u>	<u>SHEEP</u>	<u>GOATS</u>
1. Jamaica	354/496 (81%)*	77/100 (77%)	392/479 (82%)
2. St. Kitts/Nevis	58/78 (74%)	169/239 (71%)	104/158 (66%)
3. Antigua	161/195 (83%)	147/212 (69%)	18/18 (100%)
4. St. Lucia	92/124 (74%)	54/55 (98%)	15/18 (83%)
5. Barbados	108/179 (60%)	318/541 (59%)+	94/111 (85%)
6. Grenada	35/39 (89%)	116/124 (94%)	38/53 (72%)
7. Trinidad & Tobago	391/554 (71%)	84/96 (88%)	375/421 (89%)
8. Guyana	403/719 (56%)	194/387 (50%)	104/255 (40%)
9. Suriname	370/451 (82%)	68/77 (88%)	62/68 (91%)
-----	-----	-----	-----
Totals	1972/2835 (70%)	1227/1834 (67%)	1202/1581 (76%)
-----	-----	-----	-----

Countries listed by latitude from North to South

* Number with antibody/number tested (%positive)

+ Metcalf, H.E. (1979) Investigations on the epidemiology of bluetongue in Barbados Blackbelly sheep. USDA/PAHO/Barbados. Ministry of Agriculture. Unpublished Report. (Sera collected in 1979).

Table 2 PREVALENCE OF ANTIBODY TO BLUETONGUE VIRUS IN DIFFERENT AGE
GROUPS OF CATTLE, SHEEP AND GOATS IN TRINIDAD AND TOBAGO IN 1982.

Age	<u>Cattle</u>		<u>Sheep</u>		<u>Goats</u>	
	<u>No. + ve</u> No. tested	% + ve	<u>No. + ve</u> No. tested	% + ve	<u>No. + ve</u> No. tested	% + ve
1	83/114	73	6/9	67	35/43	74
1	72/95	76	13/17	79	104/117	89
2	223/324	69	64/69	93	228/252	61

Note. Numbers do not total to that shown in Table 1 because age of some animals not available.

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RABIES

<u>Country</u>	<u>Species</u>	<u>No. of Cases</u>	<u>No. Vaccinated</u>
		<u>Quarter</u>	<u>Quarter</u>
Grenada	Bovine	3	22
	Canine	-	136
	Caprine	6) 69
	Ovine	3	
Suriname	Bovine	-	-
Trinidad & Tobago*	Bovine	-	755
	Caprine	-	153
	Equine	-	19
	Ovine	-	25

- * Bat transmitted paralytic Rabies considered Endemic
 Canine Rabies exists in Haiti.
 Bat transmitted rabies exists in Guyana & Suriname
 Rabies does not exist in Barbados, Dominica, Jamaica, St. Lucia.
 Last case of Canine Rabies in Trinidad & Tobago - 1912.

TETANUS

<u>Country</u>	<u>Species</u>		<u>No. of Cases per Quarter</u>			
	<u>Bovine</u>	<u>Caprine</u>	<u>Equine</u>	<u>Ovine</u>	<u>Porcine</u>	<u>Total</u>
Grenada	-	8*	1	8*	6	15
Guyana	-	-	4	13	-	17
Jamaica	3	30	4	-	14	51
Trinidad & Tobago	-	4	1	-	-	5

- * Grouped - Sheep and Goats

/...

BRUCELLOSIS

<u>Country</u>	<u>Species</u>	<u>No. tested/quarter</u>		<u>No. of Farms</u>	<u>No. Positive</u>
		<u>Slaughter</u>	<u>Field</u>		
Barbados	Bovine	-	3	-	-
Jamaica	Bovine	10424	7322	113	18
St. Lucia	Bovine	-	50	1	-
Suriname	Bovine	91	275	5	4*
Trinidad & Tobago	Ovine	-	12	-	-

* On one Farm

TUBERCULOSIS

<u>Country</u>	<u>Species</u>	<u>No. tested/ Quarter</u>	<u>No. of Farms</u>	<u>No. Positive</u>	
				<u>No. Cases</u>	<u>No. Farms</u>
Jamaica	Bovine	5169	79	4	2
St. Lucia	Bovine	50	1	-	-
Suriname	Bovine	-	-	1*	-
Trinidad & Tobago	Bovine	25	-	-	-

* Slaughter

/...

HAEMOPARASITES

<u>Country</u>	<u>Species</u>	<u>No. of Cases/Quarter</u>		<u>No. Tested</u>	<u>No. Farms</u>	<u>No. Deaths</u>
		<u>Ana</u>	<u>Piro</u>			
Barbados	Bovine	33	4	-	-	-
	Canine	-	1	-	-	-
	Caprine	15	-	-	-	-
	Equine	-	3	-	-	-
	Ovine	1	-	-	-	-
Grenada	Bovine	7	-	-	-	-
Guyana	Bovine	101	28	-	-	23
	Ovine	21	-	-	-	-
Jamaica	Bovine	25	-	25	25	-
	Canine	-	13	13	13	-
	Caprine	1	-	1	1	-
Trinidad & Tobago	Bovine	188	7	-	-	6
	Caprine	1	-	-	-	-

LEPTOSPIROSIS

<u>Country</u>	<u>Species</u>	<u>No. Tested/Quarter</u>	<u>No. Positive</u>
Barbados	Bovine	1	-
	Canine	2	-
	Equine	1	1
Guyana	Bovine	594	339
	Human	49	11
Jamaica	Bovine	461	154
	Canine	35	12
	Caprine	96	36
	Equine	1	-
	Human	104	26
	Ovine	10	1
	Porcine	1	-
Trinidad & Tobago	Ovine	12	-

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ENDOPARASITES

<u>Country</u>	<u>Bovine</u>	<u>Canine</u>	<u>Caprine</u>	<u>Species - No. of Cases/Quarter</u>						<u>Total</u>
				<u>Equine</u>	<u>Feline</u>	<u>Ovine</u>	<u>Porcine</u>	<u>Zoo</u>		
Barbados	*(10) 6	(82) 62	(6) 5	(10) 4	(1) 1	(29) 24	-	-	102	
Grenada	231	73*	762*	20	73*	762*	278	-	1364	
Guyana	1640	40	372	12	-	863	20	9	2956	
Jamaica	852	-	601	78	-	317	519	-	2367	
Trinidad & Tobago	279 ^o	2	205	1	-	31	12	-	530	

13.

() - No. Tested
 * - Grouped e.g., Dogs & Cats
 Sheep & Goats
 o - Includes Buffaloes

MASTITIS

<u>Country</u>	<u>Species</u> - <u>No. of Cases/Quarter</u>							
	<u>Bovine</u>	<u>Canine</u>	<u>Caprine</u>	<u>Equine</u>	<u>Feline</u>	<u>Ovine</u>	<u>Porcine</u>	<u>Total</u>
Grenada	22	-	36*	-	-	36*	16	74
Guyana	20	-	9	-	-	-	-	29
Jamaica	398	-	23	-	-	-	18	439
Trinidad & Tobago	199	-	11	-	-	-	1	211

METRITIS

Jamaica	176	-	34	1	-	4	23	238
Trinidad & Tobago	128	-	4	-	-	-	14	146

14.

MANGE

Barbados	-	(10) 4	-	-	(1) -	-	-	4
Grenada	-	9	-	-	-	-	3	12
Guyana	-	-	-	-	-	-	27	27
Jamaica	-	17	-	-	-	-	-	40
Trinidad & Tobago	9	-	-	-	-	-	27	36

* - Grouped
() - No. Tested

ENDOPARASITES

<u>Country</u>	<u>Species</u> - <u>No. of Cases/Quarter</u>										<u>Total</u>
	<u>Bovine</u>	<u>Canine</u>	<u>Caprine</u>	<u>Equine</u>	<u>Feline</u>	<u>Ovine</u>	<u>Porcine</u>	<u>Zoo</u>			
Barbados	*(10) 6	(82) 62	(6) 5	(10) 4	(1) 1	(29) 24	-	-			102
Grenada	231	73*	762*	20	73*	762*	278	-			1364
Guyana	1640	40	372	12	-	863	20	9			2956
Jamaica	852	-	601	78	-	317	519	-			2367
Trinidad & Tobago	279 ^o	2	205	1	-	31	12	-			530

13.

() - No. Tested
 * - Grouped e.g., Dogs & Cats
 Sheep & Goats
 o - Includes Buffaloes

MASTITIS

<u>Country</u>	<u>Species</u>							<u>Total</u>
	<u>Bovine</u>	<u>Canine</u>	<u>Caprine</u>	<u>Equine</u>	<u>Feline</u>	<u>Ovine</u>	<u>Porcine</u>	
Grenada	22	-	36*	-	-	36*	16	74
Guyana	20	-	9	-	-	-	-	29
Jamaica	398	-	23	-	-	-	18	439
Trinidad & Tobago	199	-	11	-	-	-	1	211

METRITIS

Jamaica	176	-	34	1	-	4	23	238
Trinidad & Tobago	128	-	4	-	-	-	14	146

14.

MANGE

Barbados	-	(10)	4	-	-	(1)	-	4
Grenada	-	9	-	-	-	-	3	12
Guyana	-	-	-	-	-	-	27	27
Jamaica	-	17	-	-	-	-	-	40
Trinidad & Tobago	9	-	-	-	-	-	27	36

* - Grouped
 () - No. Tested

INFECTIOUS POULTRY DISEASES

Country	Aspergillosis	CRD	Coryza	Encephalomalacia	Endoparasites	Fowl Pox	Gumboro Disease	Infectious Bronchitis	Leucosis	Marek's Disease	Mycoplasmosis	New Castle Disease	Pasteurellosis	Salmonellosis
<u>Barbados</u>														
No. Tests	-	-	-	-	-	-	101	-	-	-	-	-	-	-
No. Positive	6	-	-	-	-	2	64	-	1	-	-	-	-	1
<u>Guyana</u>														
No. of Farms affected	-	-	2	-	-	-	-	-	-	-	-	-	1	-
No. of Birds affected	-	-	-	-	-	-	-	94	-	-	-	-	-	-
Mortality	-	-	2	-	52	-	-	-	-	-	-	-	-	-
<u>Jamaica</u>														
No. of Farms affected	-	-	58	-	48	-	14	-	-	20	-	46	-	-
No. of Birds affected	-	-	45000	-	20000	-	-	-	-	-	-	-	-	-
No. Vaccinated	-	-	-	-	-	-	31000	-	55000	-	7020000	-	-	-
<u>Trinidad & Tobago</u>														
No. of Farms affected	-	-	-	-	-	-	-	-	-	-	-	2	-	-
No. of Birds affected	-	-	-	-	-	-	-	-	-	-	-	10	-	-
No. Vaccinated	-	-	-	-	-	-	-	-	-	-	-	20	-	-
<u>Trinidad & Tobago</u>														
No. of Farms affected	-	8	5	-	-	1	-	-	-	-	3	4	-	-
No. of Birds affected	-	70000	23050	-	-	10000	-	-	-	3004	20100	-	-	-

BLACKLEG

<u>Country</u>	<u>Species</u>	<u>No. of Cases</u>	<u>No. Vaccinated</u>	<u>No. of Farms</u>
Jamaica	Bovine	-	4327	431

SCREWWORMS

<u>Country</u>	<u>Bovine</u>	<u>Caprine</u>	<u>Equine</u>	<u>Ovine</u>	<u>Porcine</u>	<u>Total</u>
Guyana	620	-	-	10	-	630
Trinidad & Tobago	12*	3	2	1	1	19

* - Includes Buffalo

SWINE ERYSIPELAS

<u>Country</u>	<u>No. of Cases/Quarter</u>	<u>No. Vaccinated</u>	<u>No. of Farms</u>
Jamaica	-	1203	69
Trinidad & Tobago	23	-	-

REPRODUCTIVE HERD HEALTH

<u>Country</u>	<u>No. of Cases Examined</u>	<u>No. of Farms</u>	<u>No. of Bulls Examined</u>
Jamaica	4699	91	194
Trinidad & Tobago	1478	83	-

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IMPORT INSPECTIONS - TRINIDAD & TOBAGO

<u>Country of Origin</u>	<u>Avian</u>	<u>Canine</u>	<u>Caprine</u>	<u>Equine</u>	<u>Feline</u>	<u>Ovine</u>	<u>Total</u>
Barbados	-	5	-	5	-	-	10
Canada	-	-	-	2	2	-	4
England	80	34	-	-	1	-	115
Grenada	-	-	85	2	-	169	256
Netherlands	3135	-	8	-	-	-	3143
St. Lucia	2	2	-	-	-	-	4
St. Vincent	-	-	-	-	-	52	52
USA	-	-	-	5	1	-	6
TOTAL	<u>3217</u>	<u>41</u>	<u>93</u>	<u>14</u>	<u>4</u>	<u>221</u>	<u>3590</u>

ANIMAL DISEASE REPORTING PERSONNEL

- Barbados: Dr. Trevor King
Senior Veterinary Officer
Ministry of Agriculture, Food
& Consumer Affairs
Animal Health Services
The Pine, St. Michael
- Dominica: Dr. W.M. Christian
Chief Veterinary Officer
Ministry of Agriculture
Roseau, Commonwealth of
Dominica
- Grenada: Dr. K.S. Manyam
Chief Veterinary Officer
Ministry of Agriculture, Rural
Development & Cooperatives
P.O. Box 141, St. George's
Tanteen
- Guyana: Dr. R.N.D. Raja
Principal Agriculture Officer (Ag.)
Ministry of Agriculture
Veterinary & Livestock Division
Regent & New Garden Sts. G'town
- Haiti: Dr. Fred Calixte
Chef, Service Veterinaire
DARNDR
Damien, Port-au-Prince
- Jamaica: Dr. Clifford L. Grey
Director of Veterinary Services (Ag.)
Ministry of Agriculture
P.O. Box 309, Kingston
- St. Lucia: Dr. Keith Scotland
Chief Veterinary Officer
Ministry of Agriculture
Castries
- Suriname: Dr. Robert Lieuw-a-Joe
Chief, Veterinary Inspection
Ministry of Agriculture
P.O. Box 1016, Paramaribo
- Trinidad
& Tobago: Dr. Vincent G. Moe
Technical Officer - Livestock Div.
Ministry of Agriculture
St. Clair Circle, Port of Spain
- Dr. Vincent St. John
Veterinary Pathologist
Veterinary Laboratory
St. Michael
- Miss Judy Baldeau
Laboratory Technician
Ministry of Agriculture, Rural
Development & Cooperatives
P.O. Box 141, St. George's
Tanteen
- Dr. Lennox Applewhaite
Senior Veterinary Officer
Veterinary Laboratory
Ministry of Agriculture
Mon Repos, East Coast Demerara
- Dr. Max Millien
Chef, Laboratoire Veterinaire
DARNDR
Damien, Port-au-Prince
- Dr. George Hylton
Deputy Director
Linton McDonnough Memorial
Veterinary Laboratory
P.O. Box 309, Kingston
- Mr. John Simon
Laboratory Technician
Ministry of Agriculture
Castries
- Dr. Ken Moll
Veterinary Diagnostic Laboratory
P.O. Box 1016, Paramaribo
- Dr. Edward P. Cazabon
Veterinary Pathologist
Veterinary Diagnostic Laboratory
Curepe, Port of Spain



